

# Energy Awareness

*Background Research*

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## 1 Introduction

Energy Awareness has been a popular topic for some years now. Emerged from subjects such as nature sustainability, nature protection and renewable energies, Energy Awareness nowadays has found its own namespace and can be seen as a distinct field of research as well as in education terms but also in Design.

How can energy consumption be made more obvious, how can it be made experienceable? Can specially designed products or services change people's perception of the energy consumption caused by themselves? Could such a development lead to a more conscious interaction with electronic devices? Could energy consumption be lowered to adequate levels, so that a more sustainable living could be leveraged?

Today's energy consumption is driven by unconsciousness. Most devices don't give any feedback on how much or even if they use any energy. It's a *laissez faire* situation. I think that's one main reason why most people don't really care about how much energy they use and how their energy usage relates to their environment. People are just not confronted to their usage patterns.

Product Design for example has traversed a number of different phases when examining the relation of outer product aesthetics to the electronics or mechanics inside. The most obvious tendencies were the times when the hiding of the inner „guts“ had more practical reasons, followed by the intentional exposure of the inner electronics through transparent plastics such as in the nineties and finally to today's complete designed liberation of all inner functionality through clean, polished sterility and minimalism.

Maybe today's „Design for functionality“ could be translated into some kind of „Design for awareness“ - where no more the pure function is at the top of it all, but where the function at least is accompanied by an effort to encourage the user to be more aware about his actual interaction with the artefact or service.

This kind of product would not necessarily be intended for mass production or for the market, as its actual value would be more of a conceptual and critical nature. It should offer a moment of reflection, animate for discussions and inspire.

## 2 Electricity as a material

I decided to limit this project to energy in the form of electricity. Placing the focus on electricity should help to concentrate stronger on specific points of interest, where treating the full spectrum of energy as such would just offer so much more and thus maybe distract.

Electricity, in the form in which most of us percept it, also offers a lot of interpretation space, room to play with it. As there is no overall or official way to describe the materiality of electricity, it is absolutely interesting to Designers to work with it. The possibilities of forging new ways of materialization, haptic, audible or visual manifestation of it, are really big and open. Interweaving electricity withing artefacts intentionally and so using it as a new kind of raw material can lead to new ways of human perception of it (*Mazé, 2010, p. 17*).

What kind of haptic qualities could electricity have? Would it feel smooth or rather rough? Would it feel hard and edged or soft and round? In what color range could it manifestate?

Such questions, answered by a big enough amount of people through different kinds of inquiry methods such as cultural probes or interviews, could lead to very inspiring insights for the Designer's point of view.

A very exciting part of electricity manifestation is also the physics of electromagnetic waves, emitted by electronic devices. These waves cannot be seen by the human eye but exist and can easily be tracked and measured. Many people fear those mystic fields of electrical energy and try to avoid them as good as possible. This „Hertzian Space“ (*Dunne/Raby, 2001, p. 12*) also offers a lot of experimentation potential. The scientifically not well enough researched damage potential of electromagnetic waves also supports its designability.

Electricity offers a broad range of designable substance - which can be seen as big amounts of raw material (*Dunne/Raby, 2001, p. 26*), waiting to be used for construction, information visualization and perception shifting.

## 2.1 Electricity, mystics & curiosity

Electricity, like most of people perceive it, is charged with different kinds of characteristics and popular beliefs like:

[...]

*is invisible*

*can flow*

*can be weak or strong*

*can cause shocks*

*is transported with cables*

*comes from energy plants*

*can be stored (batteries)*

*is coupled to sustainability discussion*

Such naive understandings and misinterpretations can offer a lot of playground for designers and artists, as the topic can be treated in very pictured and metaphorical kind of ways. The direct, physic and scientific correctness would not play such a big role as the communication of the specific idea and message would.

[...]

## 2.2 Forms, states & transformations

[...]

[...]

## **2.3 Electromagnetism**

*<http://www.who.int/mediacentre/factsheets/fs193>*

[...]

*<http://www.equilibrauk.com/emfsbio.shtml>*

### 3 Design & Energy Awareness

*«The design profession needs to mature and find ways of operating outside the tight constraints of servicing industry. At its worst, product design simply reinforces global capitalist values. [...] It (design) needs to establish an intellectual stance of its own, or the design profession is destined to lose all intellectual credibility and be viewed simply as an agent of capitalism.» (Dunne/Raby, 2001, p. 59)*

Designing for Energy Awareness picks up a popular and relevant subject. Generally, it's mostly engineers and scientific people who work on such topics, by trying to make technical appliances more efficient and less power consuming, for example.

It is evident that our civilization is becoming more and more dependent on electricity. Our lives are heavily dependant on electronic devices and ultimately on electricity, which again is bound to energy sources. The current development trends seem so as if these circumstances are going to be reinforced further. So it is not a question of stopping these developments, nor is it an option to go backwards. Instead, we need to initiate change (Mazé, 2010, p. 21).

Can consumer information campaigns and more energy efficient technology finally relieve us from our unconscious energy consumption? Should we wait for more advanced technology to solve all of these problems?

We should already start now and try to help people be more aware of their usage of objects by, for example, enhancing our everyday interactions with awareness supporting features.

Interaction Design could specially fulfill such a duty by designing processes in such a way that they do not only support the function's objective - processes could contain and materialize information about usage statistics and consumption patterns. Instead of hiding the usage consequence (such as natural decay) of artefacts, it would be possible to „unfold“ this information, to make usage actually evident, inevitable and unavoidable.



### 3.1 Topic popularity

[...]

[...]

## 3.2 Designing energy

[...]

[...]

### 3.3 Raising awareness

*<http://arstechnica.com/business/the-networked-society/2012/02/gamification-green-tech-makes-energy-use-a-gameand-we-all-win.ars>*

[...]

## 4 Human conscience & consumption

To better design such enhancements, one should understand and study how humans behave psychologically in cases when they are confronted with their energy consumption in direct ways.

People can be attracted to products by Design. This is what Design mainly tries to do these days. The human conscience is not touched by Design in such appliances. Although: guilty, bad, but also pure and clean conscience could be used as a part of the Design of a product. Artefacts can not only support the users efficiency and make him feel better, but they could also let the user know if they fail to use the product in a way that is not sustainable (to the product itself, to the environment or to the user). Such critical products would not only confirm the user (which sometimes would be a lie anyway or not conform to the reality) but they would also criticize the user or his usage pattern and so hopefully affect his conscience.

In addition, Designers need to differ from persuasion and ideological critique as well (*Mazé, 2010, p. 30*).

This ideological influence should not be overused if the product should still preserve its functionality - but it could easily be exaggerated if the artefact should rather carry a conceptual or critical value.

An interesting melting point does also emerge from the the topics of human conscience and the user's fear or interpretations of the not graspable things that electricity create, such as current flow or electromagnetic waves and fields. Critical products could easily pick up this thread and play with it, trying to control the user's conscience by forming fear and frightening or unpleaseful situations intentionally.

The human conscience itself is a hard to grasp factor and could be taken on in experimental and conceptual ways.

Also, connecting multiple users with each other by exposing their particular consumption patterns and so influencing their consciences would be an interesting approach.

## 4.1 Initiate change in behaviour

[...]

[...]

## 4.2 Collective & private conscience

[...]

[...]

## 5 Existing projects

In the following chapter I will introduce some existing approaches in Design. These projects treat the thematics sometimes very differently, but I believe this variety to be something essential for finding inspirational input and generating own ideas.

I will analyze all this work in an examination scheme, which will cover the following attributes and characteristics.

*Title/Credits/Year*

*Form (Installation/Object/Application)*

*Used materials*

*Aesthetics*

*Designed perception of electricity*

*Functionality (critical/affirmative Design)*

*Ideology*

Through the use of such a examination scheme I will be able to systematically analyze the single projects and find differences and also similarities easier.

Finally I will arrange the examined projects in corresponding groups and express conclusive findings based on this project research.

# The Power Aware Cord, Interactive Institute Umea, 2005

The Power Aware Cord is an enhanced multi-plug connector device which reflects the amount of electricity passed through it by emitting light. The more electricity is used, the more it will glow. Also, the light seems to move inside the cable. It is a household appliance, an everyday object which is extended to directly display energy consumption.

<b>Form</b> Object, multi-plug connector	<b>Aesthetics</b> Sterile, clean, some „look in-side“ (electronics exposure)	<b>Functionality</b> Very direct visual feedback but no control options, serves its purpose
<b>Used materials</b> Plastic enclosure, milky translucent, soft plastic for cables	<b>Designed electricity</b> Blue glow through material, moving glow, pulse	<b>Ideology</b> There's no hiding from the „fact“ displayed by the light feedback





**Aware Puzzle Switch, Interactive Institute Umea, 2005**

Through exploitation of the humans sense for order, this switch tries to be more often switched off than on. As long as the puzzle is solved, the lights are out. To switch on the lights (or any other device), the puzzle must be unsolved.

<b>Form</b> Object, switch-dial	<b>Aesthetics</b> Clean, simple design, strange color choice (pink/ black)	<b>Functionality</b> Probably very little efficiency in real life, conceptual/critical oriented Design
<b>Used materials</b> Hard plastic, two colored	<b>Designed electricity</b> Solved puzzle = no energy, unsolved puzzle = energy	<b>Ideology</b> Exploiting human instincts to lower energy usage



**Share Aware Lamps, Interactive Institute Umea, 2005**

The Share Aware Lamps are a series of lamp objects which all share a constant amount of energy. On the top of each lamp there is a roller knob which controls the light amount of each lamp. If one gets turned up, the others dim down, and vice versa. It expresses the collective consumption dilemma that if someone wants to use more, others have to use less.

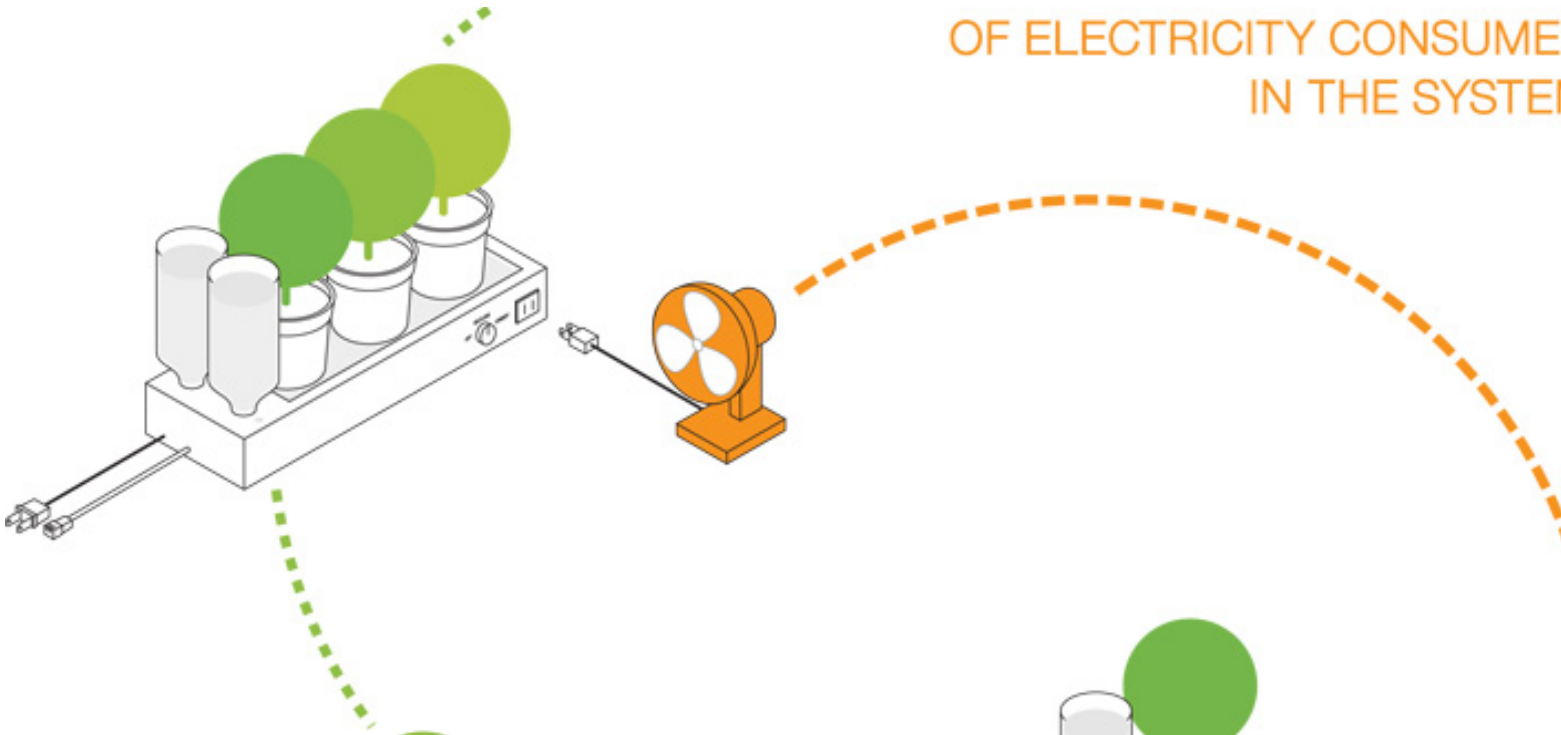
<b>Form</b> Object, series of wireless lamps with control knobs	<b>Aesthetics</b> Sterile, mystical, special form design, calm	<b>Functionality</b> Conceptual/critical Design, function lies within making people think
<b>Used materials</b> Milked glass, metal knobs	<b>Designed electricity</b> Light source, controllable	<b>Ideology</b> Conscious consumption to preserve enough energy for group functionality or social reasons



# Natural Fuses, Haque Design, 2009

Natural Fuses is a project which consists of modular plant systems which act as electricity fuses, by only letting as much energy flow, as the plants can compensate through the absorption of CO2. The plants are also connected to each other over ethernet, so they share their potential energy, which then can be used by the plant's owner.

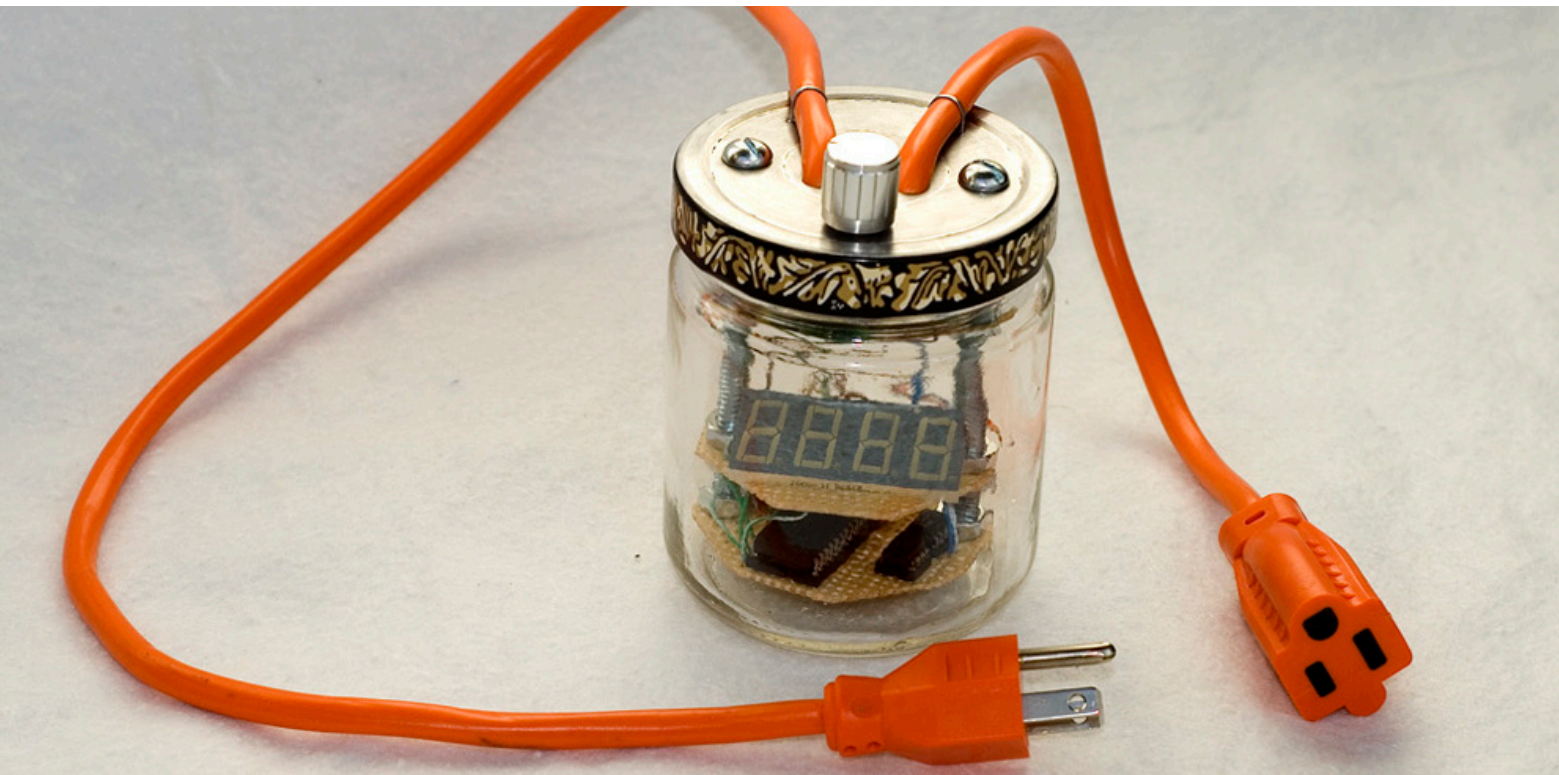
<b>Form</b> Plants, arranged inside a cases, with supplies of water	<b>Aesthetics</b> Honest, open form and semi-direct insight into „mechanics“ and functionality	<b>Functionality</b> Not for real life use, but functions well to demonstrate CO2/energy relation
<b>Used materials</b> Plants, earth, Oxygen, CO2, Water, electric appliances	<b>Designed electricity</b> Metaphorical „conversion“ from Air (CO2) to energy	<b>Ideology</b> Participative engagement, only use as much energy as CO2 can be compensated



**Enerjar, Matt Meshulam & Zach Dwiel, 2008**

The EnerJar is an easy-to-build device that accurately measures the power draw of electrical appliances and presents it on a digital display inside of a glass jar. The project is specifically intended for DIY builders - the schematics can be freely downloaded and shared.

<b>Form</b> Glass jar with display and electronics inside, cables for input and output	<b>Aesthetics</b> Honest, compact, „look in-side“ (electronics exposure)	<b>Functionality</b> Through exposure of electric flow amount, user gets informed about consumption
<b>Used materials</b> Glass, digital display, power cables	<b>Designed electricity</b> Displayed electricity amount in red digits	<b>Ideology</b> Offering a possibility to „read“ the amount of power flowing through the jar



# Is this your future?, Dunne & Raby, 2001

This project is a Critical Design experiment exploring different energy futures. Through photographic scenarios, the authors chose to design a collection of hypothetical products to explore the ethical, cultural and social impact of different energy futures.

<b>Form</b> Series of photographs	<b>Aesthetics</b> Sterile, clean, brutality, fictional scenery, fictional social and ethic situations	<b>Functionality</b> No direct functionality, 'Design Noir' (critical Design)
<b>Used materials</b> Human waste (fecals), organic material (rats), blood, water	<b>Designed electricity</b> Energy lies within organic matter, waste = energy and vice versa	<b>Ideology</b> Once we need more waste than we waste, would we grow animals for energy?!

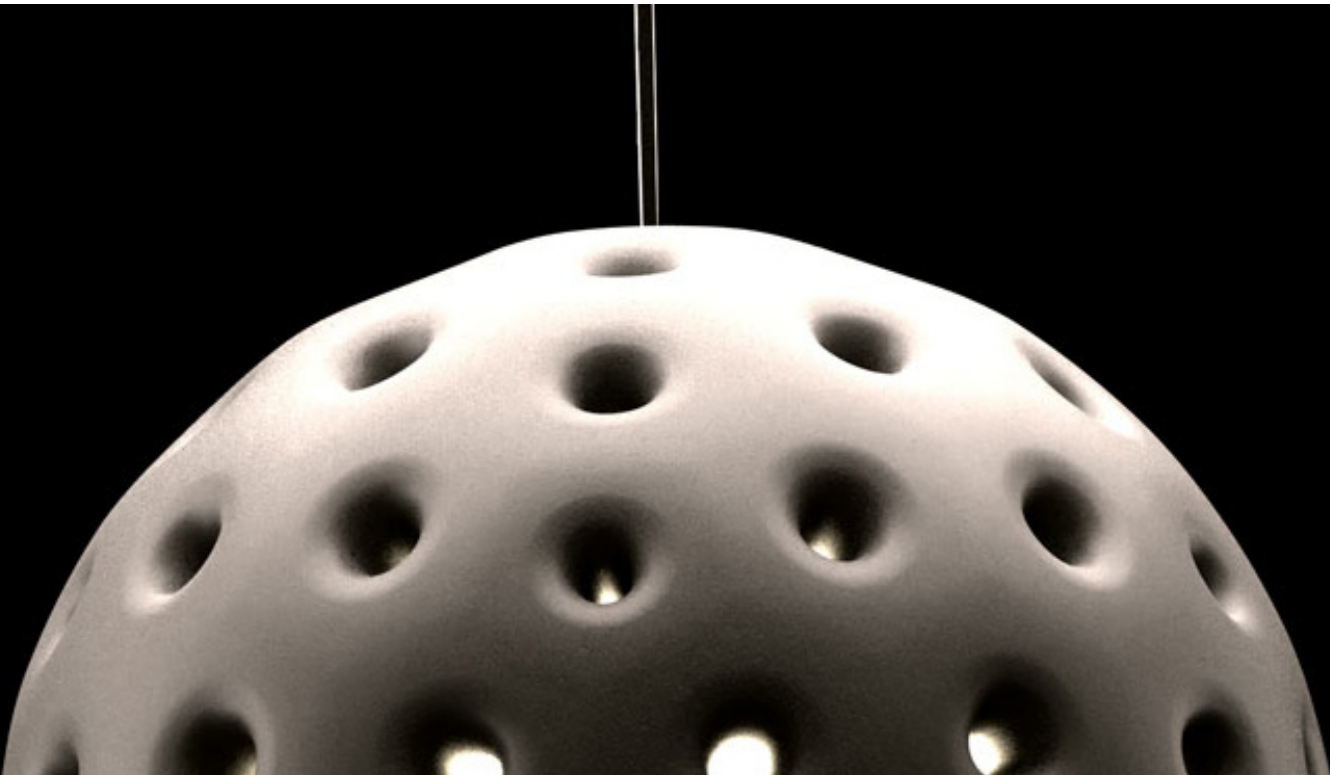




**Carnivorous Domestic Entertainment Robots, Auger-Loizeau, 2009**

This project consists of devices which all transform organic, animal matter into electricity. The devices are designed to fit into domestic situations such as living rooms. A flytrap or a mousetrap which nicely fits into domestics and in addition generates energy.

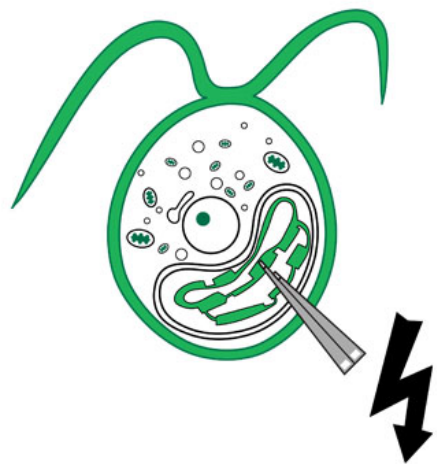
<b>Form</b> Series of mechanical furniture/devices	<b>Aesthetics</b> Built into furniture, exploiting existing trap devices, clean	<b>Functionality</b> Energy transformation from organic matter to raw electric power (very little, though)
<b>Used materials</b> Wood, metal, plastic, organic matter (insects and rats)	<b>Designed electricity</b> Light being emitted from device	<b>Ideology</b> Bizarre hybrids between machine and living organism, harnessing energy of meat



**Latro, Mike Thompson, 2010**

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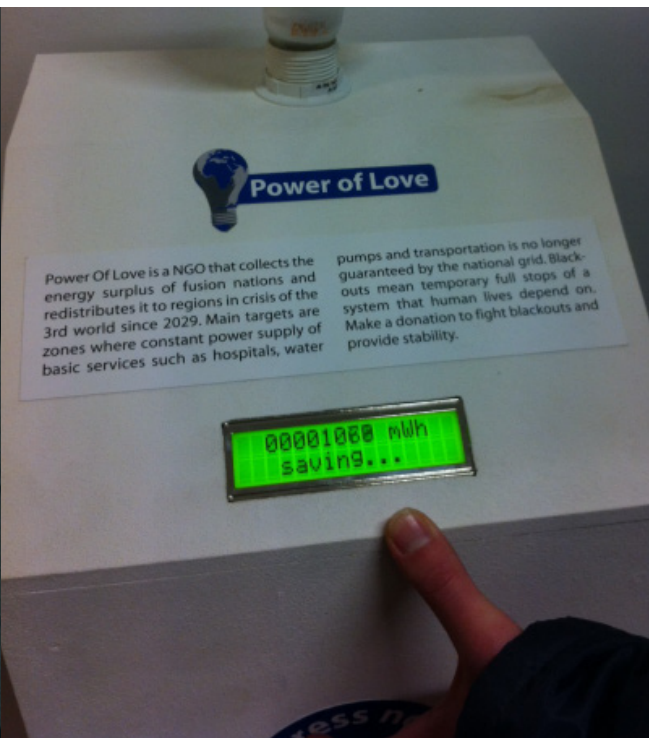
<b>Form</b> Triangular three parted ,bottle' with handle like top	<b>Aesthetics</b> Similarity to handheld oil lamps, clean, exposure of algae direct transition to light	<b>Functionality</b> Drawing algae electrical cur- rent and using it to light up the lamp
<b>Used materials</b> Glass, air, algae, water	<b>Designed electricity</b> Light through milky glass	<b>Ideology</b> Organic matter transformed into electric power



# Power Of Love, Unknown (FH Potsdam), 2012

This installative object raises the fictional situation of a post 3rd World War and lets people donate energy to landmarks that have had a stronger damage impact during the war and are cut off from energy or still recuperating. If you press the button, the light goes out and the saved energy amount displayed gets donated. If you release, the light goes back on.

<b>Form</b> Installation, light bulb, info text on label and button	<b>Aesthetics</b> Simple, direct Design, technical touch through digital display	<b>Functionality</b> Conceptual impact, moment of reflection (1 second light = ~1000 mWh energy)
<b>Used materials</b> Wood, light bulb, digital display, button	<b>Designed electricity</b> Emitted light from bulb, but also warmth	<b>Ideology</b> Showing how much energy a light bulb consumes and to donate it to the more needy





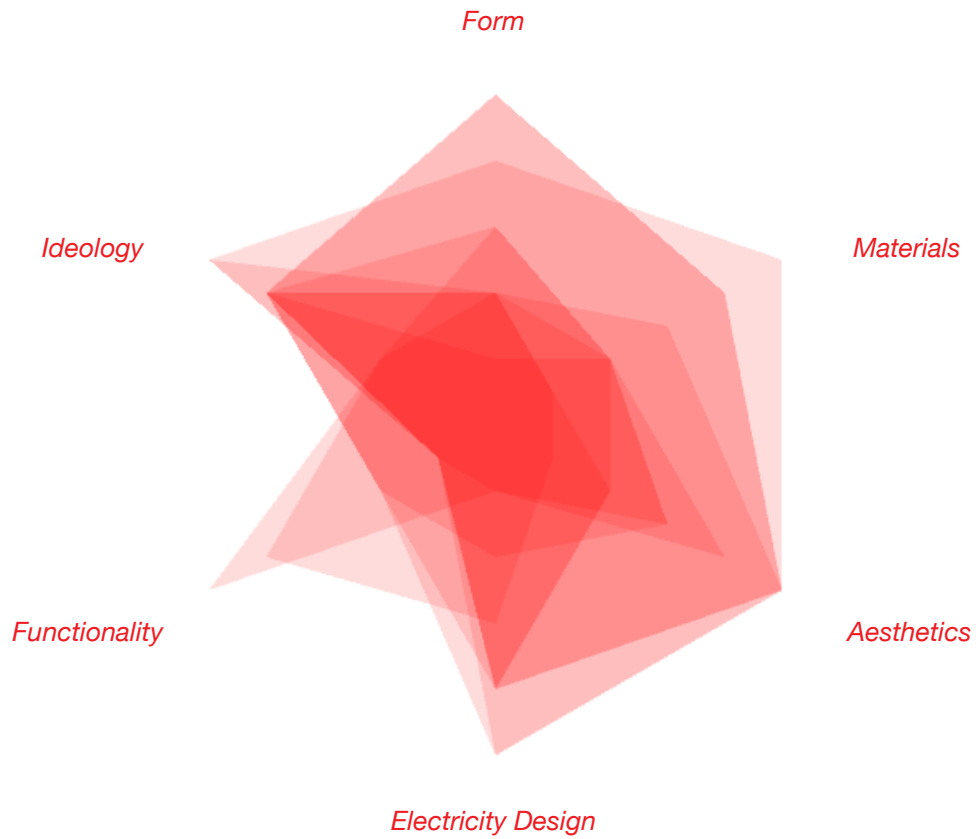
## ThinkEco Modlet, ThinkEco, 2010

The ThinkEco Modlet is one example of market available 'Smart Plugs'. It can be chained in between an electrical appliance and the electricity wall plug. By WiFi it then communicates with your computer, from where you can track the attached appliances electricity consumption. Also, it is programmable to cut off appliances from electricity at certain times.

<b>Form</b> Object, multi-plug connector	<b>Aesthetics</b> Sterile, clean, focused on simplicity, round edges, childish	<b>Functionality</b> Users can track their energy consumption via web app and control the energy flow
<b>Used materials</b> Plastic enclosure	<b>Designed electricity</b> Only visible in web app	<b>Ideology</b> Offer more control and awareness to your electric appliances



## 5.1 Comparison scheme



## 5.2 Conclusions

Overall, one can say that the existing projects seem to have spreaded their focus points over the entire spectrum. Also, the projects are sometimes quite different and come from different origins of purpose, so it they are not always directly comparable.

*Still, it seems like, within the range of all examined projects, there is a lot of focus on Electricity Design and Ideology, whilst Materials and Functionality seem to have not been focused on that much.*

These findings depend strongly on subjective observation and evaluation. As many of the examined projects consist of conceptual/critic Design, it is difficult to make neutral and objective statements and also it is clear that *functionality* is not so prominent but *ideology* is instead.

The seeming lack of focus on materials and functionality makes it tempting to go into exactly that direction. At least aesthetics through materials is a crucial aspect to me and my future project, so I could hang onto it and set an emphasis on it.

Further, while researching on existing projects, I found that there is not so much work which treats electricity as something *mystical* and *magical*, as it was perceived in the early discovery years.

## 6 Final words

[...]

[...]